

Radioactive contamination at the Jana Elementary School, Hazelwood, MO

**Incomplete testing by the U.S. Army Corps of
Engineers nevertheless reveals hazards.**

Prepared by: Boston Chemical Data Corp.
Marco Kaltofen, PhD., PE (civil, MA)
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U.S. Army Corps of Engineers (“Army Corps”) documents recently obtained by the Missouri Coalition for the Environment through a Freedom of Information Act request reveal the presence of elevated amounts of radionuclides on and under the grounds of the Jana Elementary School in Hazelwood, MO. These radionuclides include isotopes of both radium and thorium.

The combined activities of dangerous alpha-radiation emitting radionuclides (radium and thorium) on the Jana School site exceed the level of 5 picoCuries per gram (pCi/g) above background for isotopes of radium or thorium as specified in 40 CFR 192. The US Environmental Protection Agency (EPA) notes that a clean up level of no more than 5 pCi/g above background is the actual health-based clean up level expected when radium and thorium are comingled, according to EPA’s “Use of Soil Cleanup Criteria in 40 CFR Part 192 As Remediation Goals for CERCLA Sites” (1988, p. 5).

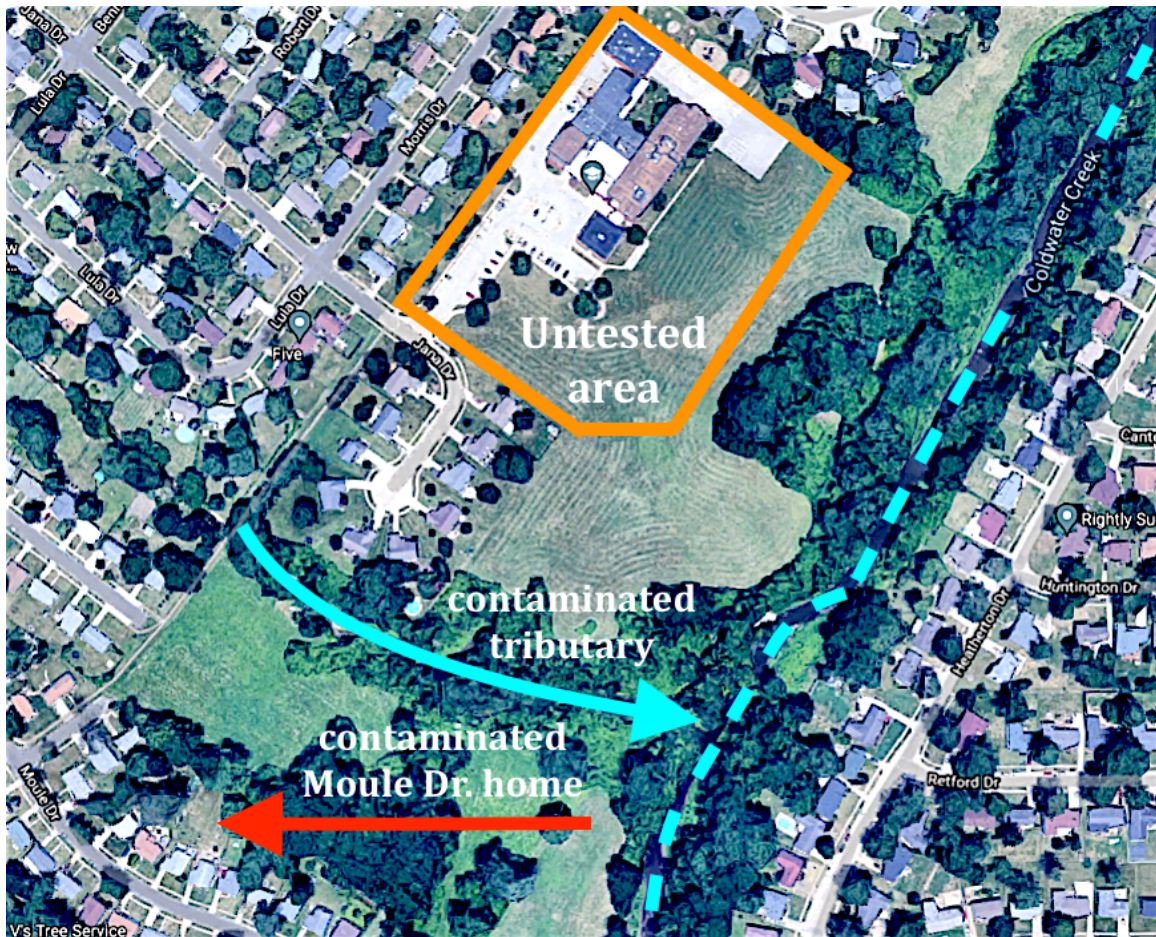
Testing shows the nature of the radioactive material at the school is consistent with the radioactive legacy uranium processing wastes notoriously found in the heavily-contaminated Coldwater Creek in North St. Louis County, MO, and in low-lying areas subject to flooding from the creek. Based on data from the US Agency for Toxic Substances and Disease Registry and peer-reviewed scientific literature (ATSDR 2019, Kaltofen 2018) the radioactive waste found at the Jana School matches that found in the St. Louis Airport, HISS, and other radioactively-contaminated locations. Most importantly, the radioactive wastes at the Jana School and other North St. Louis County sites are rich in thorium-230, a radioactive isotope that emits highly-damaging alpha radiation.

The Jana School property is bordered on two sides by Coldwater Creek and one of its contaminated tributaries. The property is low-lying in elevation and subject to flooding from Coldwater Creek. The primary isotope found by the Army Corps at the Jana School was thorium-230. Upstream and off of this site along Coldwater Creek, the Army Corps found as much as 178,000 pCi/g of thorium-230 versus a background level of 1.51 pCi/g, so the condition of the school grounds is not surprising (NUREG CR2722, Table 4).

Army Corps test results show radioactivity well in excess of 5 pCi/g levels determined by the EPA to be protective of human health. In fact the Army Corps data shows that surface soils at the Jana School reach 22.60 ± 4.39 pCi/g, and as much as 34.30 ± 6.61 pCi/g in subsurface areas. EPA has a subsurface criterion of 15 pCi/g for subsurface thorium (also from 10 CFR Part 192). This subsurface criterion from EPA is likewise exceeded at the

Jana School.

The Army Corps' tests are incomplete and inadequate because no samples were collected from school buildings on the school property where the Army Corps found radioactive contamination in outdoor soils, including in buried soils. It is not possible to assess the risk to students and employees of Jana Elementary because the Army Corps' testing was limited to outdoor soil samples. The Army Corps also failed to sample from areas nearest the actual occupied school buildings.



Above: Map showing Jana School surrounded on two sides by contaminated areas, location of contaminated Moule Drive homes, and untested area closest to the school.

The school staff and students spend most of their time indoors each school day, but no indoor samples were collected or tested. The soil samples were also collected on portions of the property furthest from the actual school building itself. Radioactive contaminants are spread towards the school buildings by creek flooding, nevertheless, all of the Army Corps soil samples were taken at least 300 feet from the school buildings, and thus away from areas most used by children and staff, and away from locations where the greatest number of people would be expected to congregate.

The contamination on Jana School grounds extends from the surface soils to depths as much as six feet below the ground surface. The Army Corps did not test more than six feet below ground, so the true depth of radioactive contamination on the Jana site is unknown. There is no data to determine whether or not radioactive contamination exists below that depth.

Despite these inadequacies, Army Corps data found 84 locations and depths on the school property where thorium-230 was significantly above the expected background of 1.5 pCi/g. The average activity of these 84 samples was 6.18 ± 1.46 pCi/g of thorium-230.

To fully characterize the risk presented by the Defendants' radioactive thorium to residents of the Coldwater Creek area, the U.S. Agency for Toxic Substance Disease Registry (ATSDR) advises interior sampling of structures with contaminated exterior soil like Jana Elementary (ATSDR 2019).

ATSDR recommends that the FUSRAP program continue investigating and cleaning up Coldwater Creek sediments and floodplain soils to meet regulatory goals. To increase knowledge

about contaminant distribution and allay community concerns, we recommend future sampling include

Areas reported to have received soil or sediment moved from the Coldwater Creek floodplain (such as fill used in construction)

Areas with possible soil or sediment deposited by flooding of major residential tributaries to Coldwater Creek

Indoor dust in homes where yards have been cleaned up or require cleanup

Sediment or soil remaining in basements that were directly flooded by Coldwater Creek in the past

ATSDR recommends signs to inform residents and visitors of potential exposure risks in areas around Coldwater Creek not yet investigated or cleaned up.

Engineers and experts that have been studying nearby homes found that indoor samples from creek-facing homes in the neighborhood of the Jana Elementary School had the same types of radioactive materials both indoors and outdoors. In 2019 ATSDR has noted that radioactive wastes are routinely moved from Coldwater Creek into homes due to flooding.

“If floodwaters inundated a home’s basement directly, some of the sediment washed inside could possibly contain Th-230 or other radiological contaminants. If Th-230 was present in sediments remaining on walls or floors of a basement, residents could accidentally swallow it or disturb it enough to inhale it. Radiological contamination in and around Coldwater Creek, prior to remediation activities, could have increased the risk of some types of cancer in people who played or lived there. Children and adults who regularly played in or around

Coldwater Creek or lived in its floodplain for many years in the past (1960s to 1990s) may have been exposed to radiological contaminants. ATSDR estimated that this exposure could have increased the risk of developing lung cancer, bone cancer, or leukemia.”

One nearby home on Moule Drive was tested and found to be contaminated by these same radioactive wastes. Worse, this same home also had metallic thorium (used in the making of atomic bombs) and cesium-137 (a radioactive isotope associated with nuclear wastes). Indoor dust samples collected from this home were found to be contaminated with thorium-containing radioactive particulate matter (RPM). The most likely source of these radioactive materials is flooding from the creek, which carries contaminated sediments into the house's basement and surrounding soils.

RPM inside the home had up to 70.4 percent thorium by weight (704,000 ppm). Indoor house dust also contained mercury (3.16 ppm) and cadmium (14.3 ppm). These concentrations for mercury and cadmium are more than ten times the expected level. Radioactive cesium-137 was found at 2.20 ± 1.09 and at 4.71 ± 2.80 pCi/g; more than twenty times the highest background levels found in the area (Kaltoven 2018 citing Wallo 1994). Indoor dust at the home also had 6.23 ± 0.52 pCi/g of Pb210, compared to the background activity of 2.08 pCi/g (EPA Region 7 Site Background & Current Conditions, <https://semspub.epa.gov/work/07/30337840.pdf>).

The homes on Moule Drive are located about 400 to 500 feet from the areas tested by the Army Corps. Like the Jana School property, these Moule Drive homes border on and are sometimes flooded by Coldwater Creek. Inhaling,

ingesting or even dermal (skin) contact with these radioactive materials found inside the home can cause significant biological damages. It is important to test for these same materials indoors at the nearby elementary school.

The Army Corps first detected radioactive thorium near the school in 2018 and confirmed the results with further testing in 2019, 2020 and 2021. ATSDR made its Coldwater Creek-area indoor testing recommendations in 2019. The Army Corps informed the Superintendent of the Hazelwood School District on January 27, 2022. “The property located at 405 Jana Drive is identified as CWC-386. The results show the presence of low-level radioactive contamination on this property located in the banks of Coldwater Creek within the property boundary.” This “low-level radioactive contamination” is many times the allowable EPA clean-up levels for thorium and radium. According to the EPA Region 7 proposed record of decision for this area, the clean up levels are:

Radium-226 + Radium-228 < 2.9 pCi/g

Thorium-230 + Thorium-232 < 2.9 pCi/g

The actual “low” levels found for these isotopes range up to 3.91 pCi/g for radium-226 + radium-228 and 35.50 pCi/g for Thorium-230 + Thorium-232.

References:

ATSDR 2019, Evaluation of Community Exposures Related to Coldwater Creek, EPA FACILITY ID: MOD980633176

www.atsdr.cdc.gov/sites/coldwater_creek/docs/St_Louis_Airport_Site_Hazelwood_InterimSto_PHA-508.pdf

Kaltofen 2018, Forensic microanalysis of Manhattan Project legacy radioactive wastes in St. Louis, MO,
<https://doi.org/10.1016/j.apradiso.2018.02.020>

Appendix 1: Summary of Army Corps Data

The results of the Army Corps analyses show that radioactive contamination is present on the Jana Elementary School property. The following results are for the Army Corps Jana School data in pCi/g. Background activities for these isotopes are approximately 1.0 to 1.5 pCi/g in soil and these charts isotopic results in soils above 2.0 pCi/g. Data is in pCi/g.

(reference: <https://semspub.epa.gov/work/07/30356608.pdf>)

Jana School samples with elevated Ra-226 (2 pCi/g or more, 11 of 215)

SVP211105	2.04 ± 0.52	SVP208718	2.50 ± 0.61
SVP211106	2.05 ± 0.53	SVP208731	3.01 ± 0.73
SVP205298	2.10 ± 0.51	SVP208723	2.06 ± 0.50
SVP205299	2.90 ± 0.70	SVP208720	2.22 ± 0.54
SVP205306	2.48 ± 0.61	SVP208719	2.09 ± 0.51
SVP208714	2.09 ± 0.51		

Mean = 2.32 ± 0.57 Range = ND to 3.01 Background 1.06

Jana samples with excessive Th-228 (3 of 215)

SVP190155	2.25 ± 0.70
SVP202537	2.13 ± 0.72
SVP207132	2.22 ± 0.82

Mean = 2.20 ± 0.75 Range = ND to 2.25

Jana samples with excessive Th-230 (84 of 215, too numerous to list)

Mean = 6.18 ± 1.46 Range = ND to 34.30 Background = 1.51

Jana sample with excessive U-235 (1 of 215)

SVP190188	0.66 ± 0.36
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Mean = 0.66 ± 0.36 Range = ND to 0.66

Jana samples with excessive U-238, Ra228, or Th232 (0 of 215)

Appendix 2: Proposed Site Inspection Activities

Objective

The primary scientific objective of this proposed Jana Elementary School, Hazelwood School District, 405 Jana Lane, Florissant, MO (Jana School), sampling plan is to collect and analyze samples of outdoor soils and indoor dusts from locations that were not sampled in the 2018 to 2022 US Army Corps of Engineers' (Army Corps) sampling and testing program. These include samples of bulk dusts or wipe samples from interior spaces of the Jana School, as well as outdoor soil and dust samples collected within 300 feet of the occupied school buildings. In addition a number of soil and sediment samples in the Army Corps-sampled areas will also be collected. Soil and sediment samples will be hand-collected at or with 18 inches of the ground surface.

Site Description

The sample site is an elementary school located at 405 Jana Lane, Florissant, MO. The school is bounded on four sides by Coldwater Creek, a tributary stream to Coldwater creek, Jana lane and by residential housing developments. The creek and tributary beds are known to be contaminated with isotopes of radium and thorium (primarily thorium-230) from historic radiological contamination originating upstream of the site. Radiological contaminants have been mobilized by (among other factors) Coldwater Creek flooding, including flooding as recently as late July 2022.

Contaminants of Concern

Prior testing has found Ra-226, Ra-228, U-235, Th-228, Th-230, Th-232, Cs-137, Pb-214, Pb-212, Pb-210, Bi-214 and Po-210 on this and on surrounding properties.

Proposed Analytes

Based on site history and on the contaminants of concern listed, the proposed analyses include:

- Isotopic radium by alpha spectroscopy

- Isotopic uranium by alpha spectroscopy

- Isotopic thorium by alpha spectroscopy

- Pb-210/Po-210 by Eichrom method

- Cs-134, Cs-137 + NORM isotopes by HPGE gamma spectroscopy

- SEM/EDS analysis (X-ray microspectroscopy)

Analyses will be performed by an independent certified commercial laboratory, Eberline Analytical of Oak Ridge, TN, and Microvision laboratories of Massachusetts. Sample jars and documents (chains of custody, custody seals) for bulk soil and dust samples will be provided by Eberline Analytical. Settled dust samples will be collected using Zefon® Biotape® prepared microslides for SEM/EDS analyses.

Sampling Description

Sampling technicians will collect and analyze samples of up to 36 outdoor soils and 24 indoor dusts. The bulk (but not all) of these samples will be taken from locations that were not sampled in the 2018 to 2022 US Army Corps of Engineers' (Army Corps) sampling and testing program (see figure at end of sample protocol). These include samples of bulk dusts or wipe samples from interior spaces of the Jana School, as well as outdoor soil and dust samples collected within 300 feet of the occupied school buildings. In addition a number of soil and sediment samples in the Army Corps-sampled areas will also be collected.

Soil and sediment samples will be hand-collected at or with 18 inches of the ground surface. Dust samples will include bulk samples (such as the contents of on-site vacuum cleaners, dusts hand-collected from air handling equipment including ventilation and food refrigeration equipment) and lift-tape samples from both interior and exterior structural and other surfaces. Interior dust sample collections may require the use of approved ladders during collection.

Standardized US EPA Good Laboratory Practices and full chain of custody documentation shall apply. Level IV documentation packages will be required from the contract laboratories where applicable. Split samples will be made available after laboratory homogenization. Biotape® slide samples will be collected in duplicate and provided as splits during or immediately after field sampling.

A rate counter or GPS-enabled rate counter may be employed for safety or record-keeping reasons, but will not be used to select or reject sample locations or sample aliquots.

Sample collection will require a full day for interior sampling, and one to two full days for exterior (soil and sediment) sampling.

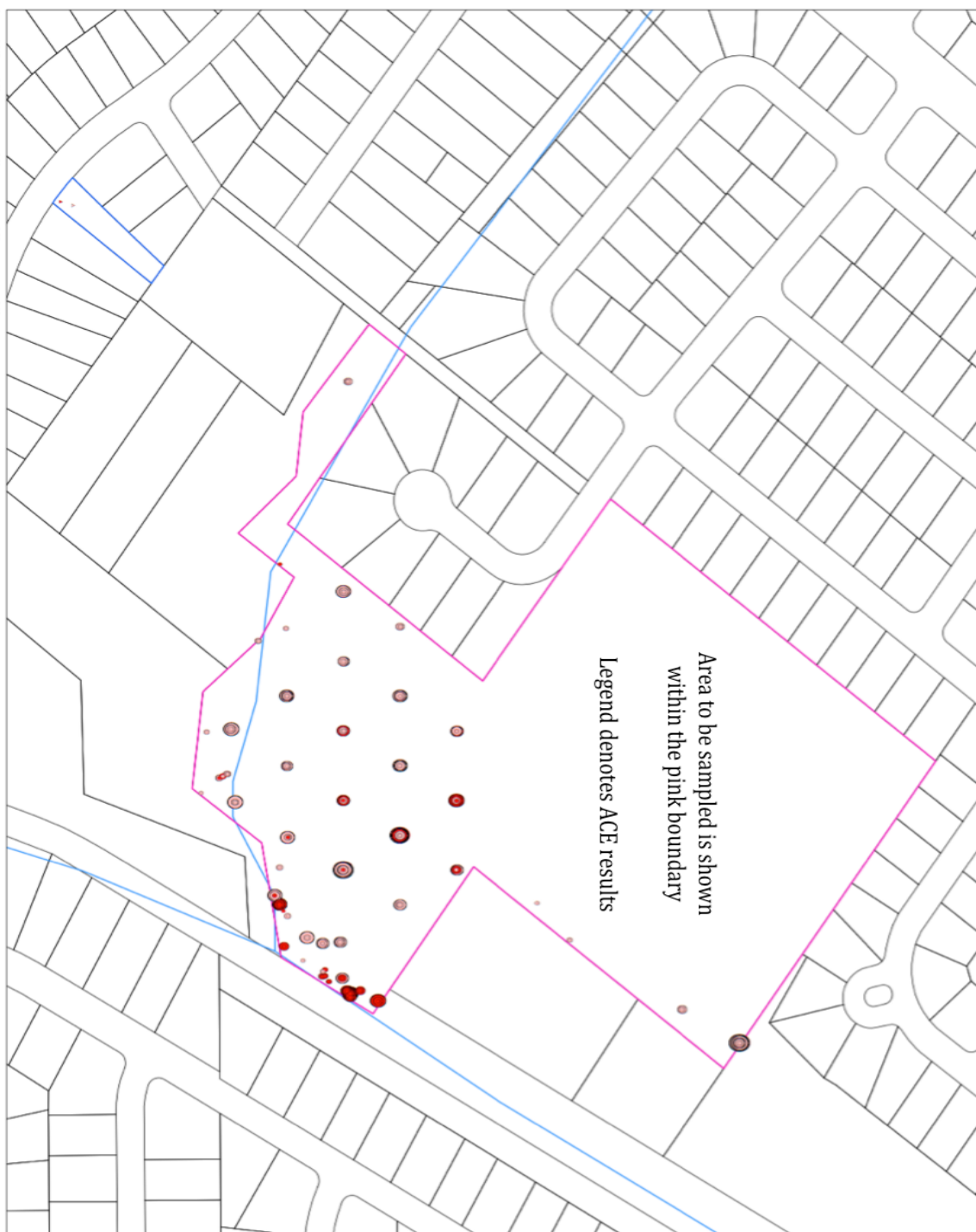
Sample sizes are anticipated to range from 125 ml to 500 ml, and sufficient equipment and precleaned containers will be staged to cover the full range of potential sample amounts that are likely to be encountered. All samples will be double bagged and labelled upon collection.

A trip blank will be used for the Biotape® slides and bulk samples. Duplicate samples will be collected at a rate of 1 per 10 unique samples.

At the end of each sampling event all samples will be transferred to a sealed cooler with chain of custody and custody seals for transfer to the appropriate laboratory via Fed Ex or equivalent service.

A copy of the completed chains of custody will be provided to each party at the earliest opportunity.

Draft Presentation of Field Testing Results
of Jean Elementary School and Surrounding Area
July 26, 2022



Legend

- 435 Maple Drive Boat Samples 9-4.5' (2)
- Detector (1)
- Impacted (1)
- 6-4.5' (78)
- Detector (43)
- Impacted (27)
- 6.8-1' (17)
- Detector (7)
- Impacted (19)
- 1-1.5' (21)
- Detector (19)
- Impacted (8)
- 1.8-2' (19)
- Detector (13)
- Impacted (8)
- 2-2.5' (9)
- Detector (8)
- Impacted (1)
- 2.5-3' (8)
- Detector (4)
- Impacted (4)
- 3-3.5' (12)
- Detector (8)
- Impacted (8)
- 3.5-4' (12)
- Detector (8)
- Impacted (4)
- 4-4.5' (12)
- Detector (5)
- Impacted (7)
- 4.5-5' (13)
- Detector (7)
- Impacted (8)
- 5-5.5' (9)
- Detector (7)
- Impacted (2)
- 5.5-6' (8)
- Detector (2)
- Impacted (4)
- 6-6.5' (2)
- Detector (2)
- Impacted (1)
- 6.5-7' (1)
- Detector (1)
- 7-7.5' (1)
- Impacted (1)
- 8-8.5' (2)
- Detector (2)
- Impacted (1)
- 8.5-9' (1)
- Detector (1)
- 435 Maple Drive
- Jean Elementary School
- Cadotte Creek
- St. Louis County Parks